

## REMARKS

Claims 1-4 and 7-29 are pending in the application and stand rejected. Claims 1, 14, 16, 17, 21, 24, and 29 have been amended. Claims 2-3, 23, 25, and 28 have been canceled. Reconsideration and allowance of Claims 1, 4, 7-22, 24, 26, 27, and 29 are respectfully requested in view of the above amendments and following remarks.

### Amendments to the Claims

This amendment is filed in response to the final Office Action mailed November 7, 2008. Applicant's submit that the amended claims have been amended to include the recitations of dependent claims that have already been Examined, and thus no additional searching is required to Examine the claims. For example, Claim 1 has been amended to include the recitation of Claim 28, which has been canceled. Entry of the amendment is respectfully requested.

### "Intended Use" Language in Claims 1, 14, 17, and 24

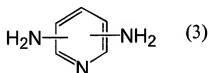
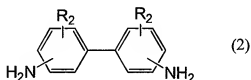
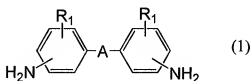
The Examiner notes that Claims 1, 14, 17, and 24 have language based on an intended use, particularly with regard to a recited thermal shrinkage ratio in case of thermal treatment at 105°C for 8 hours. Because the Examiner believes that language of the claims is optional with regard to the thermal treatment, the Examiner has not considered the thermal treatment as a limitation of the claims. As amended, Claims 1, 14, 17, and 24 positively recite that the thermal shrinkage ratio occurs upon thermal treatment at 105°C for 8 hours, thus positively reciting the thermal treatment as a feature of the claims.

### The Rejection of Claims 1, 4, 7-14, 18, 21, 22, 24, and 26-28 Under 35 U.S.C. §§ 102/103

Claims 1, 4, 7-14, 18, 21, 22, 24, and 26-28 stand rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Takeo et al. (EP 1 202 365). Withdrawal of this ground for rejection is respectfully requested for the following reasons.

LAW OFFICES OF  
CHRISTENSEN O'CONNOR JOHNSON KINDNESS<sup>PLC</sup>  
1420 Fifth Avenue  
Suite 2800  
Seattle, Washington 98101  
206.682.8100

Claim 1, from which Claims 4, 7-9, and 11-13 depend, recites an electrolyte membrane that includes a porous substrate filled with a first polymer having proton conductivity. As amended, Claim 1 recites a porous substrate consisting of a polyimide obtained from biphenyltetracarboxylic acid dianhydrides as tetracarboxylic acid components and diamines selected from the group consisting of diamines represented by the following general formulae (1) to (3).



The porous substrate has a polymer phase and a void phase within the structure and includes microscopic continuous holes in the porous substrate. The porous substrate has a porous structure in both surfaces. The porous substrate has an average pore diameter of 0.01 to 1  $\mu\text{m}$  and the porous substrate has a heat resistant temperature of 200°C or higher and a thermal shrinkage ratio of  $\pm 1\%$  or less upon thermal treatment at 105°C for 8 hours.

Claim 14 recites a method for producing an electrolyte membrane similar to that claimed in Claim 1; however, instead of reciting specific chemical genera, as in Claim 1, Claim 14 recites that the porous polyimide substance consists of a polyimide obtained from 3,3',4,4'-

biphenyltetracarboxylic acid dianhydride as a tetracarboxylic acid component and oxydianiline as a diamine component. Claims 18, 21, and 22 depend from Claim 14.

Claim 24 recites an electrolyte membrane similar to the membrane of Claim 1; however, instead of reciting specific chemical genera, Claim 24 recites that the porous polyimide substance consists of a polyimide obtained from 3,3',4,4'-biphenyltetracarboxylic acid dianhydride as a tetracarboxylic acid component and oxydianiline as a diamine component. Claims 26 and 27 depend from Claim 24. Claim 28 has been canceled.

The independent claims at issue in this rejection, Claims 1, 14, and 24, all recite specific species (or genera) of polyimide compounds useful for making electrolytic membranes for fuel cells. The Examiner relies on Takeo et al. as teaching a product and process for making a fuel cell comprising a porous polyimide electrolyte. It is asserted that Takeo et al. teaches a broad genus that includes polyimide materials useful for making porous fuel cell materials. However, for the following reasons, the disclosure of such a broad genus is not anticipatory nor does it make obvious the specific species and narrow genera recited in Claims 1, 14, and 24 and those claims depending therefrom.

A discussion of the anticipation of a species by a genus taught by a prior art reference can be found in the Manual of Patent Examination Procedure (M.P.E.P.) § 2131.02. The M.P.E.P. states that "if one of ordinary skill in the art is able to 'at once envisage' the specific compound within the generic chemical formula, the compound is anticipated." (M.P.E.P. § 2131.02 citing *Ex Parte A*, 17 U.S.P.Q. 2d 1716 (Board of Patent Appeals and Interferences 1990). Further, "one of ordinary skill in the art must be able to draw the structural formula or write the name of each of the compounds included in the generic formula before any of the compounds can be 'at once envisaged.'" (*Ibid.*) The Takeo et al. reference only mentions polyimide once in the reference (at ¶ [0017]) and does not teach any specific embodiments that include polyimides.

Thus, Takeo et al. teaches an almost infinite number of polyimides but teaches no specific examples of such polyimides. Because the invention as set forth in Claims 1, 14, and 24 and claims depending therefrom recite specific species of polyimides that are not taught or suggested by Takeo et al. (and thus cannot be "at once envisage"), it is submitted that the reference is not anticipatory.

Furthermore, because Takeo et al. does not teach, suggest, or otherwise make obvious the specific species of polyimides set forth in Claims 1, 14, 24, and claims depending therefrom, it is submitted that the claimed invention is not obvious in view of Takeo et al.

For these reasons, withdrawal of this ground for rejection is respectfully requested.

The Rejection of Claims 2, 3, and 15 Under 35 U.S.C. § 103(a)

Claims 2, 3, and 15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Takeo et al. Claims 2 and 3 have been canceled and Claim 15 depends from Claim 14, as described above. Withdrawal of this ground for rejection is respectfully requested for the following reasons.

With regard to Claim 15, the Examiner characterizes the Takeo et al. reference as disclosing a step of heating a monomer to polymerize the monomer. The Examiner notes that Takeo et al. does not disclose repeating the same step again. The Examiner indicates that, in general, the transposition of process steps or the splitting of one step into two, where the processes are substantially identical or equivalent in terms of function, does not patentably distinguish the process.

Claim 15 depends from Claim 14, which, as set forth above, applicants assert is allowable because Takeo et al. does not teach, suggest, or otherwise make obvious every aspect of the claimed invention. Therefore, because Claim 15 depends from Claim 14, it is submitted that

Claim 15 is not taught, suggested, or otherwise made obvious in view of Takeo et al. and withdrawal of this ground for rejection is respectfully requested.

The Rejection of Claims 16, 17, 19, and 20 Under 35 U.S.C. § 103(a)

Claims 16, 17, 19, and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Takeo et al. in view of Yamaguchi et al. (JP 05-031343). Withdrawal of this ground for rejection is respectfully requested for the following reasons.

Claims 16, 19, and 20 depend from Claim 14, which has been characterized above. Claim 17 is an independent claim that recites a method for producing an electrolyte membrane similar to that of Claim 1; however, Claim 17 recites that the porous polyimide substrate consists of a polyimide obtained from 3,3',4,4'-biphenyltetracarboxylic acid dianhydride as a tetracarboxylic acid component and oxydianiline as a diamine component.

The Examiner relies on Takeo et al. as disclosing the invention of Claim 14, as described above, and further for teaching a step of plasma grafted polymerization that requires filling and heating the membrane. The Examiner notes that Takeo et al. does not disclose the use of surfactants in the monomer solution. The Examiner relies on Yamaguchi et al. as teaching the use of surfactants in the monomer solution.

Claim 14, from which Claims 16, 19, and 20 depend, and Claim 17 both recite specific species of polyimide for forming porous structures. As described above, Takeo et al. does not teach, suggest, or otherwise make obvious the species of polyimides recited by the claimed invention. Yamaguchi et al. does not remedy the cited deficiencies in Takeo et al. because Yamaguchi et al. does not teach, suggest, or otherwise make obvious the specific polyimide species recited by the claimed invention. Thus, withdrawal of this ground for rejection is respectfully requested.

The Rejection of Claims 20 and 23 Under 35 U.S.C. § 103

Claims 20 and 23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Takeo et al. in view of Brunner et al. (U.S. Patent No. 3,423,366). Claim 20 depends from Claim 14 and Claim 23 has been canceled. Withdrawal of this ground for rejection is respectfully requested for the following reasons.

Claim 20 recites a method for forming an electrolytic membrane further comprising an electrolytic substance filled in the pores having proton conductivity and is provided with a crosslinked structure by the step of heating the monomer to polymerize the substance.

The Examiner relies on Takeo et al. as teaching a method for producing an electrolyte membrane as described above with reference to Claim 14. The Examiner notes that Takeo et al. does not teach a polyimide that contains 3,3',4,4-biphenyltetracarboxylic acid dianhydride and an oxydianiline. The Examiner relies on Brunner et al. as teaching a crosslinked nitrogenous polyester of polyimide that comprises 3,3',4,4-biphenyltetracarboxylic acid or a dianhydride and an oxydianiline. The Examiner has indicated that the polyimide of Brunner et al. would be combined with the electrolyte membrane of Takeo et al. to arrive at the claimed invention. Applicants respectfully disagree.

The Examiner does not indicate how Brunner et al. teaches the crosslinked electrolyte recited in Claim 20. Brunner et al. does not teach an electrolyte, and thus does not teach a crosslinked electrolyte as in Claim 20. Applicants submit that the combination of Takeo et al. and Brunner et al. does not teach, suggest, or otherwise make obvious the crosslinked electrolyte of Claim 20.

Withdrawal of this ground for rejection is respectfully requested.

The Rejection of Claims 25 and 29 Under 35 U.S.C. § 103(a)

Claims 25 and 29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Takeo et al. in view of Brunner et al. Withdrawal of this ground for rejection is respectfully requested for the following reasons.

Claim 25 has been canceled and Claim 29 recites the electrolyte membrane of Claim 1 where the polyimide is obtained from 3,3',4,4'-biphenyltetracarboxylic acid dianhydride as a tetracarboxylic acid component and oxydianiline as a diamine component.

The Examiner characterizes Takeo et al. (as described above) as teaching a polyimide porous substrate and relies on Brunner et al. as teaching a polyimide formed from 3,3',4,4'-biphenyltetracarboxylic acid and oxydianiline. The Examiner believes that one of skill in the art would combine the teachings of Brunner et al. and Takeo et al. to arrive at the claimed invention. Applicants respectfully disagree.

Claim 29 depends from Claim 1. Claim 1 has been characterized above as being novel and non-obvious in view of the Takeo et al. reference because Takeo et al. does not teach, suggest, or otherwise make obvious the specific species of polyimide recited in Claim 1. Applicants submit that Brunner et al. does not remedy the above-cited deficiencies of the Takeo et al. reference.

Brunner et al. teaches a composition that comprises (1) a bis ester of an aromatic tetracarboxylic acid, (2) an inert organic solvent, (3) melamine, and (4) an aromatic diamine (Abstract). Brunner et al. explicitly teaches that the addition of melamine results in compositions with improved thermal stability (Col. 2, lines 59-64). Brunner et al. also teaches that the composition is useful as a varnish, syrup, coating, or impregnating/adhesive agent (Col. 2, lines 64-66). It is submitted that Brunner et al. does not teach the polyimide of the claimed invention because, *inter alia*, the reference teaches a polymer that includes melamine as an essential

element, whereas the polyimide of Claim 29 is obtained from 3,3',4,4'-biphenyltetracarboxylic acid and oxydianiline with no melamine. Relatedly, Brunner et al. does not teach or suggest the pores, pore sizes, heat resistance, and thermal shrinkage recited in Claim 1.

Additionally, one of ordinary skill in the art would not be motivated to combine the polyimide taught by Brunner et al. to form a porous substrate for supporting an electrolyte as taught by Takeo et al. because the porous substrate taught by Takeo et al. is a self-supporting substrate that is then filled with an electrolyte to occupy the pores of the substrate. Brunner et al. does not teach or suggest the use of the taught polyimide composition as a porous substrate having the characteristics recited in Claim 1 (e.g., pore diameter of 0.01 to 1 microns and heat resistant temperature of 200°C). Brunner et al. teaches the use of the disclosed polyimides as a varnish, syrup, coating, or impregnating/adhesive agent, but not as a substrate. Thus, one of ordinary skill in the art would not be motivated to use the polyimide coating of Brunner et al. as a porous substrate as taught by Takeo et al. to arrive at the claimed invention.

For the above-stated reasons, applicants assert that Claim 29 is not obvious in view of the combined teachings of Takeo et al. and Brunner et al. and withdrawal of this ground for rejection is respectfully requested.

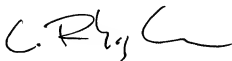


CONCLUSION

Applicants believe that the application is now in condition for allowance. Reconsideration and favorable action are requested. If any issues remain that may be expeditiously addressed in a telephone interview, the Examiner is encouraged to telephone applicants' attorney at the telephone number set forth below.

Respectfully submitted,

CHRISTENSEN O'CONNOR  
JOHNSON KINDNESS<sup>PLLC</sup>

A handwritten signature in black ink, appearing to read "L. Rhys Lawson", with a stylized flourish at the end.

L. Rhys Lawson, Ph.D.  
Registration No. 57,869  
Direct Dial No. 206.695.1698

LRL:mgp

LAW OFFICES OF  
CHRISTENSEN O'CONNOR JOHNSON KINDNESS<sup>PLLC</sup>  
1420 Fifth Avenue  
Suite 2800  
Seattle, Washington 98101  
206.682.8100